REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.:	**437-8540**
SRP Section:	**08.01 – Electric Power – Introduction**
Application Section:	**8.1**
Date of RAI Issue:	**03/08/2016**

Question No. 08.01-19

In RAI 8166, Question 08.01-7, dated August 31, 2015, the staff stated that DCD Table 8.1-2 indicated that BTP 8-1, "Requirements on Motor-operated Valves in the ECCS Accumulator Lines," was applicable to sections 8.3.1 and 8.1.3.3, and Table 1.9-2 also indicated that the APR1400 design conforms to BTP 8-1. The staff also indicated that Standard Review Plan (SRP) section 8.1 states in part that the safety analysis report should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of electrical power systems and the criteria and guidelines are listed in Table 8-1. Since the DCD did not include a discussion related to BTP 8-1, the staff asked the applicant to provide such discussion in the DCD. In response to RAI 8166, Question 08.01-7, dated January 26, 2016, ADAMS Accession ML16026A461, the applicant stated that the design of motor operated valves in the ECCS accumulator lines conforms to BTP 8-1 and is addressed in DCD Tier 2 sections 6.3.2.5.1, 7.3.1.4, 7.6.1.4 and Figure 7.6-2. The applicant added a reference in section 8.3.1.2.3 and Table 1.9-2 to indicate conformance to BTP 8-1. The staff reviewed the response and found that there was no specific mention in the referenced sections (6.3.2.5.1, 7.3.1.4, and Figure 7.6-2) about BTP 8-1. Therefore, the staff requests that the applicant provide a clear reference to the applicability of BTP 8-1 in the referenced section(s).

Response – (Rev. 1)

The design of motor operated valves in the ECCS accumulator lines conforms to branch technical position (BTP) 8-1 as currently addressed in DCD Tier 2, Subsections 6.3.2.1.1, 6.3.2.5.1, 6.3.5.3.2, 7.3.1.3, and Figure 7.6-2. (DCD section 7.3.1.4 and 7.6.1.4 referenced in the response to RAI 8166, Question 08.01-7 are not related to BTP 8-1)

BTP 8-1 will be included in the referenced section to provide a clear reference to the applicability of BTP 8-1.

DCD Tier 2, Subsection 8.3.1.2.3 was added in the response to RAI 134-8033, Question 08.03.01-12 (Reference KHNP submittal MKD/NW-15-0228L, dated October 28, 2015, ML15301A925) to include conformance with 10 CFR 50.34 related to TMI Action Plan requirements. However, the original response to this RAI question and responses to RAI 177-8166, Questions 08.01-7, 8, 9, 10, and 11 did not properly account for the previously added subsection and added descriptions of the conformance with BTPs in Subsection 8.3.1.2.3. This resulted in duplication of the subsection numbering for different issues. To correct this discrepancy, the subsection number for “Conformance with Branch Technical Positions” will be changed to Subsection 8.3.1.2.4 and all relevant subsections and table which contain reference to this subsection will also be revised accordingly. Other editorial corrections will be made as shown in the attachment.

Impact on DCD

DCD Tier 2, Subsections 6.3.2.1.1, 6.3.2.5.1, 6.3.5.3.2, 6.3.8, 7.5.1.3, 7.6.1.3, 7.6.5, and Table 1.9-2 will be revised as shown in the attachment. Also, Subsection 8.3.1.2.3 will be changed to 8.3.1.2.4.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.

Table 1.9-2 (17 of 33)

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SRP Section/Title	Revision / Issue Date	Conformance or Summary Description of Deviation	DCD Tier 2 Section
8.1 – Electric Power – Introduction	Rev. 4 02/2012	The APR1400 conforms with this SRP.	8.1
8.2 – Offsite Power System	Rev. 5 05/2010	The APR1400 conforms with this SRP.	8.2
8.3.1 – AC Power Systems (Onsite)	Rev. 4 05/2010	The APR1400 conforms with this SRP.	8.3.1
8.3.2 – DC Power Systems (Onsite)	Rev. 4 05/2010	The APR1400 conforms with this SRP.	8.3.2
8.4 – Station Blackout	Rev. 1 05/2010	The APR1400 conforms with this SRP.	8.4
App. 8-A – General Agenda, Station Site Visits	Rev. 1 03/2007	Not applicable (COL)	N/A
BTP 8-1 – Requirements on Motor-Operated Valves in the ECCS Accumulator Lines	Rev. 3 03/2007	The APR1400 conforms with this BTP.	8.1.3.3, Table 8.1-2
BTP 8-2 – Use of Diesel Generator Sets for Peaking	Rev. 3 03/2007	The emergency diesel generator (EDG) provides backup power to the safety-related loads for safety shutdown during a loss of offsite power (LOOP). However, the EDG is not used for peaking service for offsite power system. The APR1400 conforms with this BTP.	8.1.3.3, Table 8.1-2
BTP 8-3 – Stability of Offsite Power Systems	Rev. 3 03/2007	Not applicable (COL)	N/A
BTP 8-4 – Application of the Single Failure Criterion to Manually Controlled Electrically Operated Valves	Rev. 3 03/2007	The APR1400 conforms with this BTP.	8.1.3.3, Table 8.1-2

RAI 177-8166 Q.08.01-7 Att (1/2)
~~8.3.1.2.3~~
8.3.1.2.4

RAI 177-8166 Q.08.01-9 Att (1/2)
~~8.3.1.2.3~~
Delete

RAI 177-8166 Q.08.01-8 Att (1/4)
~~8.3.1.2.3~~
8.3.1.2.4
8.3.1.2.4

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Table 1.9-2 (18 of 33)

SRP Section/Title	Revision / Issue Date	Conformance or Summary Description of Deviation	DCD Tier 2 Section
BTP 8-5 – Supplemental Guidance for Bypass and Inoperable Status Indication for Engineered Safety Features Systems	Rev. 3 03/2007	The APR1400 conforms with this BTP.	8.1.3.3, ~~8.3.1.2.2,~~ ~~8.3.2.2.2~~ Table 8.1-2
BTP 8-6 – Adequacy of Station Electric Distribution System Voltages	Rev. 3 03/2007	The APR1400 conforms with this BTP with the exception of B.1. The Class 1E distribution system is separated from the offsite power system by the secondary undervoltage relay regardless of the occurrence of an SIAS.	8.1.3.3, 8.2.2.3, 8.3.1.1.2.3, 8.3.1.1.3.12, Table 8.1-2
BTP 8-7 – Criteria for Alarms and Indications Associated with Diesel-Generator Unit Bypassed and Inoperable Status	Rev. 3 03/2007	The APR1400 conforms with this BTP.	~~8.1.3.3, 8.3.1.1.3~~ ~~Table 8.1-2~~
BTP 8-8 – Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions	02/2012	Not applicable	N/A
9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling	Rev. 3 03/2007	The APR1400 conforms with this SRP.	9.1.1
9.1.2 – New and Spent Fuel Storage	Rev. 4 03/2007	The APR1400 conforms with this SRP.	9.1.2
9.1.3 – Spent Fuel Pool Cooling and Cleanup System	Rev. 2 03/2007	The APR1400 conforms with this SRP.	9.1.3
9.1.4 – Light Load Handling System and Refueling Cavity	Rev. 4 07/2014	The APR1400 conformance with acceptance criteria 5 is not applicable for the APR1400 design certification. (APR1400 is a single unit.)	9.1.4
9.1.5 – Overhead Heavy Load Handling Systems	Rev. 1 03/2007	The APR1400 conformance with exceptions. Criterion 5 is not applicable for the APR1400 design certification. (APR1400 is a single unit.)	9.1.5

RAI 177-8166 Q.08.01-10 Att (1/2)

~~8.3.1.2.3~~ → 8.3.1.2.4

RAI 177-8166 Q.08.01-11 Att (1/3)

7.5.1.3, 8.1.3.3, ~~8.3.1.2.3~~, Table 8.1-2 → 8.3.1.2.4

pressurized with nitrogen. The SITs are provided with connections for filling, draining, pressurizing, venting, relieving, and sampling. In addition, pressure and level instrumentations with appropriate alarms are provided to assure that technical specifications are met during normal power operation.

A fluidic device (Reference 3, Figure 6.3.2-2), which is installed in each of the SITs, provides two operational stages of a safety water injection into primary coolant system and results in more effective use of borated water in the SITs in the event of a LOCA.

SIT water is delivered into the vortex chamber through both the supply and control nozzles at the early stage of LBLOCA when the SIT starts to operate and the standpipe is covered with water. The SIT provides a large injection flow rate of SIT water, which is required during the refill phase of an LBLOCA. When the SIT water level is lowered to below the top of the standpipe, the flow path through the supply nozzle is absent and all SIT water is delivered only through the control nozzle. As a result, the injection flow rate of the SIT water is decreased, but is still sufficient to remove decay heat during the reflood phase, extending the total duration of the SIT water injection.

The fluidic device consists of a vortex chamber, supply port, control ports, and standpipe. The device has a supply port at the center and four control ports around the supply port with an equal circumferential angle of 90 degrees at the surface top. The supply port is connected to a standpipe that extends vertically. The vortex chamber is a flat slice of cylinder and is installed horizontally, with its axis overlapping with the centerline of the SIT.

A motor-operated isolation valve provided in each SIT discharge line is administratively controlled to open in the MCR to provide reasonable assurance of the tank's availability during normal operation. Power to the motor operator of each valve is removed to prevent inadvertent closure. To provide further reasonable assurance of SIT availability, each SIT isolation valve receives an automatic open signal if an SIAS occurs due to low pressurizer pressure or high containment pressure. During startup and shut down operations, a variable low pressurizer pressure SIAS setpoint is used, as described in Subsection 7.3.1.9.

Each motor-operated SIT isolation valve is also provided with an "auto-open" and "permissive close" interlock based on pressurizer pressure. During startup, the interlock automatically opens the valves when RCS pressure is increased above 42.2 kg/cm^{2}A

Add in accordance with BTP 8-1 (Reference 11)

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(600 psia). During plant cooldown, the interlock prevents the valves from being closed until RCS pressure is reduced to 33.4 kg/cm^{2}A (475 psia).

The SITs are normally pressurized to a nominal operating pressure of 42.9 kg/cm^2 (610 psig) for normal operation. During startup, the operator pressurizes the SITs when pressurizer pressure reaches 45.0 kg/cm^{2}A (640 psia). Failure to do so results in an alarm when pressurizer pressure reaches 50.3 kg/cm^{2}A (715 psia).

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Add — in accordance with BTP 8-1 (Reference 11)

During plant cooldown, SIT pressure is reduced to 28.1 kg/cm^2 (400 psig) before RCS pressure reaches 45.0 kg/cm^{2}A (640 psia). Inadvertent repressurization of the SITs during this mode of operation from a leaky nitrogen supply valve or by accidental tripping of a nitrogen supply valve switch is prevented by having two fail-closed valves in series with separate hand switches on each SIT nitrogen supply line. The air supply actuating the nitrogen supply valves is controlled by solenoid valves. The two nitrogen supply valve solenoids on each SIT are connected to separate electrical buses through redundant and physically separated electrical trains. The solenoids provide reasonable assurance that a fault in one of the trains does not cause a spurious opening of both nitrogen supply valves.

Redundant level and pressure instrumentation described in Subsection 6.3.5.3 and Table 7.5-1 are provided to monitor the condition of the tanks. Sufficient visual and audible indications are made available to the operator so that maintaining the SITs within the required technical specifications during various modes of plant operation. Provisions are made for sampling, filling, draining, and correcting boron concentration. Atmospheric vent valves are provided for tank venting. The valves are locked closed, and the power to each valve is removed during normal operation to prevent inadvertent SIT venting.

The SIT relief valve set at 49.2 kg/cm^2 (700 psig) is installed in the SIT to prevent the overpressure. The two check valves installed in SIT discharge line are held by pressure differential between the RCS and SIT operating pressure.

The nitrogen supply system is designed such that all four SITs can be pressurized to 44.29 kg/cm^2 (630 psig) from 0 kg/cm^2 (0 psig) within approximately 8 hours assuming minimum fluid level in the tank. The two nitrogen system isolation valves (SI-642, 649, SI-632, 639, SI-622, 629, and SI-612, 619) are provided and maximum gas volume in the tank is 17.2 m^3 (610 ft^3) each SIT. The capacity of SIT relief valve (SI-211, 221, 231, and 241) is 169.9 m^3 (6,000 ft^3) per minute.

6.3.2.5 System Reliability

6.3.2.5.1 Safety Injection Tanks

The performance evaluation in Subsection 15.6.5 demonstrates the adequacy of the quantity of coolant supplied. In order to prevent accidental discharge from the SCS suction relief valves (SI-179 and SI-189), SIT pressure is decreased to an acceptable value before reactor coolant pressure is below 45.0 kg/cm^{2}A (640 psia) and subsequently, the isolation valves on the tanks are closed. An interlock with pressurizer pressure prevents these valves from being closed if pressurizer pressure is greater than 33.4 kg/cm^{2}A (475 psia).

Inadvertent repressurization of the SITs during shutdown cooling due to a leaky nitrogen supply valve or the accidental tripping of a valve switch is prevented by having two fail-closed supply valves in series with separate hand switches. The air supply actuating the nitrogen supply valves is controlled by solenoid valves. The nitrogen supply line inside the containment is not normally pressurized.

Add in accordance with BTP 8-1 (Reference 11)

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The two nitrogen supply valve solenoids on each SIT are connected to separate electrical buses through redundant and physically separated electrical trains in order to provide reasonable assurance that a fault in one of the trains will not cause a spurious opening of both nitrogen supply valves.

The motor-operated isolation valves on the SIT discharge are interlocked with pressurizer pressure to open the valves automatically as system pressure is increased to 42.2 kg/cm^{2}A (600 psia). When RCS pressure increases to 45.0 kg/cm^{2}A (640 psia), the operator repressurizes the SITs. Failure to do so results in an alarm at a pressurizer pressure of 50.3 kg/cm^{2}A (715 psia). Further details of valve control are provided in Section 7.6.

The atmospheric vents on the SIT are locked closed, fail closed, and power to their solenoid valve is interrupted during operation when the RCS pressure is greater than 50.3 kg/cm^{2}A (715 psia). This procedure provides reasonable assurance that the tank is not vented during RCS power operation.

Add in accordance with BTP 8-1 (Reference 11)

RAI 437-8540 Q.08.01-19 Att (3/8)

6.3.5.3 Instrumentation during Operation

The instrumentation provided for monitoring SIS components during SIS operation is described in this section. The instrument readout location is described in Figure 6.3.2-1.

6.3.5.3.1 Pressure

a. SIT pressure

Pressure transmitters mounted on each SIT provide indication of the pressure in each SIT. Wide range pressure channels P-311D, 321B, 331C, and 341A provide pressure indication in the MCR and remote shutdown room. Narrow range pressure channels P-312, 322, 332, 342, 313, 323, 333, and 343 provide pressure indication in the MCR. Alarms are provided in the MCR to alert the operator to high or low SIT pressure conditions.

b. SI pump discharge pressure

Pressure channels P-306, 307, 308, and 309 provide an indication of SI pump discharge pressure in the MCR. The operator uses the pressure channels to monitor SI pump operation.

6.3.5.3.2 Valve Position

a. SIT isolation valve position

Redundant valve position indication is provided in the MCR and RSR for valves SI-614, 624, 634, and 644. The position indication verifies the fully open or fully closed position with an alarm if the valve is not fully open.

b. Hot leg injection isolation valve position

Open/closed valve position indication is provided in the MCR for valves SI-604 and 609.

RAI 437-8540 Q.08.01-19 Att (4/8)

in accordance with BTP 8-1 (Reference 11) — Add

3. APR1400-Z-M-TR-12003-P (Proprietary) & NP (Non-Proprietary), "Fluidic Device Design for the APR1400," Rev. 0, KHNP, December 2012.

4. Regulatory Guide 1.1, "Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System," Rev. 0, U.S. Nuclear Regulatory Commission, November 1970.

5. Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," Rev. 4, U.S. Nuclear Regulatory Commission, March 2012.

6. Regulatory Guide 1.79, "Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors," Rev. 1, U.S. Nuclear Regulatory Commission, September 1975.

7. 10 CFR 50.55a(f), "Inservice testing requirements," U.S. Nuclear Regulatory Commission.

8. Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," Rev. 4, U.S. Nuclear Regulatory Commission, June 2013.

9. 10 CFR 20.1406, "Minimization of Contamination", U.S. Nuclear Regulatory Commission.

10. Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation-Life Cycle Planning," Rev. 0, U.S. Nuclear Regulatory Commission, June 2008.

RAI 437-8540 Q.08.01-19 Att (5/8)

Add

~~11. BTP 8-1, "Requirements on Motor-Operated Valves in the ECCS Accumulator Lines~~

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11. NUREG-0800, Standard Review Plan, BTP 8-1, "Requirements on Motor-Operated Valves in the ECCS Accumulator Lines," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.

l. Emergency diesel generator area HVAC system

m. Control room HVAC system

n. Electrical and I&C equipment areas HVAC system

o. Fuel handling area HVAC system

p. Auxiliary building controlled area HVAC system

q. Reactor containment building purge system

7.5.1.4 Alarm System

The alarm system alerts the operators by means of visual and audible signals of abnormal conditions that require operator action.

The alarm system is designed to perform the following functions:

a. Alerting the operators to off-normal conditions that require the operator to take action

b. Guiding the operators to the appropriate response

c. Assisting the operators in determining and maintaining an awareness of the state of the plant and its systems or functions

Reliability

The alarm system is reliable based on following features:

a. The alarm system is implemented in both the IPS and QIAS-N. Alarms that are used for all operating modes including normal, AOOs, and PAs are provided in redundant operator workstation consoles by the IPS. The IPS has redundant alarm servers. An important alarm list is shown on the QIAS-N displays on the safety console.

RAI 177-8166 Q. 08.01-11 Att (2/3)

b. The IPS is configured by diverse hardware and software from the QIAS-N.

Add

The BISI design for the EDGs is described in Subsection ~~8.3.1.2.3~~.

8.3.1.2.4

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The SIT permissive interlocks are used to allow isolation of the SITs below the pressure required for mitigation following a loss of coolant accident (LOCA). See Figure 7.6-2 for the interlock logic.

The isolation valves are manually closed when RCS pressure drops below the setpoint in Table 7.6-1 so that the SITs cannot cause overpressurization of the SCS while the SITs are maintained above atmospheric pressure.

As RCS pressure increases, the valves automatically reopen at the set pressure.

The opening of the SIT isolation valves provides reasonable assurance that the SITs are available for injection during plant startup.

If the isolation valves are closed and an SIAS is initiated, the isolation valves automatically open. The SIAS overrides the interlock or any manual signal.

RAI 437-8540 Q.08.01-19 Att (6/8)

Add in accordance with BTP 8-1 (Reference 13)

The alarm associated with the SITs is activated if the RCS [illegible] determined values and the SITs have not been repressurized.

Physically separate and independent signals are provided for SIT isolation valve interlocks. Refer to Section 6.3 for SIS and Subsections 3.9.6.3.1 and 6.3.4 for valve tests.

RAI 437-8540 Q.08.01-19 Att (6/8)

7.6.1.4 Component Cooling Water Supply and Return Header Tie Line Isolation Interlocks

Add in accordance with BTP 8-1 (Reference 13)

The CCW system removes heat from all safety components required for normal power plant operation, and normal and emergency shutdown of the plant, and transfers the heat to the essential service water through the CCW heat exchangers. The CCW system also provides cooling water for some non-safety components required for plant operation.

Non-essential supply and return header isolation valves are provided to isolate the non-essential supply and return headers from the essential supply and return headers in the event of an accident. These valves are two series electric motor operated valves and can be remotely operated.

These valves are automatically closed on an SIAS or low-low CCW surge tank level signal. The valve closure times are set to prevent complete loss of surge tank volume due to a

11. Regulatory Guide 1.118, “Periodic Testing of Electric Power and Protection Systems,” Rev. 3, U.S. Nuclear Regulatory Commission, April 1995.

12. NUREG-0737, Item II.D.3, “Clarification of TMI Action Plan Requirements,” 1980.

RAI 437-8540 Q.08.01-19 Att (7/8)

Add

~~13. BTP 8-1, "Requirements on Motor-Operated Valves in the ECCS Accumulator Lines~~

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13. NUREG-0800, Standard Review Plan, BTP 8-1, "Requirements on Motor-Operated Valves in the ECCS Accumulator Lines," Rev. 3, U.S. Nuclear Regulatory Commission, March 2007.

NRC RG 1.160 endorses Revision 4A of NUMARC 93-01 (Reference 45), which provides methods for complying with the provisions of 10 CFR 50.65 with some provisions and clarifications. Conformance with NRC RG 1.160 is addressed in Section 1.9.

NRC Regulatory Guide 1.204

NRC RG 1.204 is related to the guidelines for lightning protection of nuclear power plants.

The APR1400 onsite ac power system is designed to meet the requirements of IEEE Std. 665, IEEE Std. 666, IEEE Std. 1050, and IEEE Std. C62.23 (Reference 46), which are related to the lightning protection of nuclear power plants.

NRC Regulatory Guide 1.218

NRC RG 1.218 provides the cable design and maintenance criteria for the performance of periodic testing as part of the condition-monitoring techniques for the electric cables that are used in nuclear power plants. The inaccessible cable condition-monitoring techniques related to NRC RG 1.218 are addressed in Subsection 8.3.1.1.10.

Insert Section from next pages

8.3.1.3 Electrical Power System Calculations and Distribution System Studies for AC System

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The analysis of load flow, voltage regulation, and short-circuit studies is performed by using ETAP, version 12.0.0N, which is qualified for nuclear power plants in accordance with 10 CFR Part 21, 10 CFR Part 50, Appendix B (Reference 47), and ASME NQA-1 (Reference 48).

8.3.1.3.1 Load Flow/Voltage Regulation Studies and Under/Overvoltage Protection

Load flow studies of onsite power systems are performed to demonstrate that acceptance voltage regulation is maintained within 90 to 110 percent of the rated voltage at the equipment terminals under the worst-case condition among normal, startup, hot standby, and LOCA operation mode. Lager motor starting studies calculate the voltage drop so that motor terminal voltages are maintained at not less than acceptance voltage of 75 percent of motor rating for Class 1E motors and 80 percent of motor rating for non-Class 1E motors.

RAI 134-8033 Q. 08.03.01-12 Att (6/8)

8.3.1.2.3 Conformance with 10 CFR 50.34 Related to TMI Action Plan Requirements

10 CFR 50.34(f)(2)(v) (TMI Item I.D.3) requires the applicant to provide for automatic indication of the bypassed and operable status of safety systems. Information regarding bypassed and inoperable status indication of the Class 1E onsite ac and dc power system and the Class 1E EDG system is described in Subsection 7.5.1.3. Conformance with the requirement of 10 CFR 50.34(f)(2)(v) is addressed in Subsection 7.5.2.3.

10 CFR 50.34(f)(2)(xiii) (TMI Item II.E.3.1) is related to providing pressurizer heater power supply and conformance with the requirement of 10 CFR 50.34(f)(2)(xiii) is addressed in Subsection 8.3.1.1.2.

10 CFR 50.34(f)(2)(xx) (TMI Item II.G.1) is related to providing power supplies for pressurizer relief valves, block valves, and level indicators. For the APR1400, there is no power-operated relief valve (PORV) or block valve which requires any electrical power. The Class 1E 120Vac I&C power system, backed up by EDGs and batteries, supplies power for pressurizer level indication instruments as described in Subsection 7.1.2.12. Thus, it conforms with 10 CFR 50.34(f)(2) (xx).

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8.3.1.2.4

Add underline

RAI 177-8166 Q. 08.01-7 Att (2/2)

~~8.3.1.2.3~~ Conformance with Branch Technical Positions

BTP 8-1, "Requirements on Motor-Operated Valves in the ECCS Accumulator Lines"

The design of motor operated valves in the ECCS accumulator lines conforms with BTP 8-1 (Reference 62). Conformance with BTP 8-1 is addressed in DCD Tier 2, Subsection 6.3.2.5.1, ~~7.3.1.4, 7.6.1.4~~, and Figure 7.6-2.

Add

RAI 437-8540 Q. 08.01-19 Att (8/8)

6.3.2.1.1, 6.3.5.3.2, 7.3.1.3

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8.3.1.2.4

RAI 177-8166 Q. 08.01-8 Att (3/4)

~~8.3.1.2.3~~ Conformance with Branch Technical Positions

BTP 8-2, "Use of Diesel-Generator Sets for Peaking"

The Class 1E EDGs are not used for peaking service. They provide standby power in the event of a loss of the offsite preferred power source(s). They are connected to the offsite power source, one at a time, for periodic testing as described in DCD Tier 2, Subsection 8.3.1.1.3.7.

RAI 437-8540 - Question 08.01-19_Rev.1

8.3.1.2.4 Conformance with Branch Technical Positions

RAI 177-8166 Q. 08.01-9 Att (2/2)

~~8.3.1.2.3 Conformance with NUREG-0800~~

Add underline

BTP 8-4, "Application of the Single Failure Criterion to Manually Controlled Electrically Operated Valves"

The APR1400 design of manually controlled electrically operated valves conforms with BTP 8-4 (Reference 64).

The following provides descriptions of the electrically operated valves, for which electric power is required be removed and restored to meet the single failure criterion addressed in BTP 8-4.

a. Safety injection tank (SIT) isolation valves are motor-operated gate valves provided in each SIT discharge line and are administratively controlled to open from the main control room (MCR) during normal operation. Power to the motor operator of each valve is removed to prevent inadvertent closure as described in Subsection 6.3.2.1.1, 6.3.5.3.2.a and verified by surveillance requirement 3.5.1.5.

b. SIT atmospheric vent isolation valves are solenoid globe valves provided for tank venting. The valves are locked closed and power to each valve is removed during normal operating to prevent inadvertent SIT venting as described in Subsection 6.3.2.1.1 and 6.3.2.5.1.

c. Valves in the cavity flooding system of the in-containment water storage system consist of the holdup volume tank (HVT) flooding valves and the reactor cavity flooding valves. The HVT flooding valves are motor-operated gate valves in the flow paths that connect the IRWST to the HVT, and the reactor cavity flooding valves are motor-operated gate valves in the flow paths that connect HVT to the reactor cavity. The valves are only used to flood the reactor cavity through the HVT for severe accident mitigation in the event of a severe accident. The valves remain locked closed with the power connections for the valves separated from the power source during all plant conditions. Connections are established to the power source during severe accidents as described in Subsection 6.8.2.1.2 and 6.8.2.2.4.

All safety-related electrically operated valves are operated from the MCR and the position of these valves is indicated on the Information Flat Panel Display (IFPD) and the Large Display Panel (LDP), which are driven by the Information Processing System (IPS). The valve position indications are also provided on the Qualified Indication and Alarm System-N (QIAS-N) FPD. The IPS is electrically isolated, physically separated, and diverse from the QIAS-N. Therefore, any failure of the IPS does not adversely affect the operation of the QIAS-N. Also, the position of safety-related electrically operated valves is indicated on the safety-related soft control display(ESCM).

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8.3.1.2.4

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~~8.3.1.2.3~~ Conformance with Branch Technical Positions

BTP 8-5, "Supplement Guidance for Bypass and Inoperable Status Indication for Engineered Safety Features Systems"

The Bypassed and Inoperable Status Indication for onsite power system complies with BTP 8-5 (Reference 65). Descriptions of the bypassed and inoperable status indication for engineered safety features systems are provided in Subsection 7.5.1.3.

8.3.1.2.4

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~~8.3.1.2.3~~ Conformance with Branch Technical Positions

BTP 8-7, "Criteria for Alarms and Indications Associated with Diesel-Generator Unit Bypassed and Inoperable Status

Add "

The bypassed and inoperable status indication(BISI) design for the EDGs conforms to the recommendations of BTP 8-7, except the position number 3. The EDG units of APR1400 are not shared with other units. Descriptions of the system-level BISI for the plant auxiliary systems including EDGs are provided in Subsection 7.5.1.3.